



NADCP

National Association of
Drug Court Professionals

need to **Know**

Oral Fluid Drug Testing Fools Cheaters

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The ingenuity of drug abusers to avoid detection has always been apparent but never as highly developed as today. Many drug abusers have become highly competent “cheaters” when it comes to urine drug testing. Drug abusers have detailed instructions available on the Internet on how to beat drug tests accompanied by a supporting industry of products such as synthetic urine, adulterants and devices designed to fool urine collectors and confound specimen analysis. An emerging

drug test that uses a few drops of oral fluid (primarily saliva) overcomes many of the problems of urine testing. With the advanced analytical technology available

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today, laboratory based oral fluid drug testing represents a new tool that is as accurate as urine tests and overcomes the problems associated with drug “cheaters”.

Cheating on Urine Drug Tests

Although urine has been the predominant specimen of choice for conducting drug tests, it has clearly defined collection weaknesses that have been recognized since its first use. Not only is there embarrassment to both the donor and the collector when a urine specimen is collected, drug abusers find ways to foil the drug test in a variety of innovative ways. Prior to showing up for a drug test, drug abusers know that by

“water-loading” they may escape detection by providing a highly dilute specimen thereby lowering drug concentrations below detection thresholds¹. A second dilution method is simply adding fluid to the specimen during collection. However, laboratories have become adept at detecting a “dilute” specimen; therefore, many drug abusers take additional precautions to improve their chances of escaping detection.

A variety of ways are available for beating a drug test. Adulterants (chemicals) can be purchased on the Internet and in health-food stores that, when added to urine specimens, either destroys the drug or interferes with the test method, the result being a false negative report. Adulterants are products designed to be easily concealable in clothing so they can be added to the collection cup before, during or after urination without the collector's knowledge. Detection of adulterants by laboratory analysis can be problematic; some laboratories have developed tests for specific adulterants, but new adulterants continually appear. The demand for new adulterants is such that laboratories simply cannot keep up with the expanding list of products nor can they continue to bear the associated costs of testing for each new adulterant.

Another method that has proved effective is substitution of "clean" urine in place of the individual's authentic specimen. Clean specimens can be obtained from another individual or purchased on the Internet either as freeze dried specimen (with instructions to add warm water),

Of course the additional testing costs necessary for adulterants and sample dilutions are passed along to the end user.

intact urine, or synthetic urine. Appliances, such as the Whizzinator and the Butt Wedge, can be purchased and loaded with fake urine. These urine delivery devices are difficult, if not impossible, to detect even during witnessed collection. Once a substituted specimen is collected, the laboratory cannot distinguish a substituted urine specimen from an authentic specimen.

In sum total, millions of dollars are spent yearly on these types of products designed to help drug abusers avoid drug detection; unfortunately no one really knows how frequently drug abusers attempt or are successful in beating their urine drug tests. With all the effort drug test cheaters expend, the laboratories have to stay diligent in order to catch them. Of course the additional testing costs necessary for adulterants and sample dilutions are passed along to the end user. These costs are further amplified by the "soft costs" to be considered in combating cheating attempts - keeping a bathroom secure for collections, turning off the water, bluing agents in the toilet, and mirrors; all add to the cost of urine collection.



Tips for Controlling Urine Tampering

- Use Random Donor Selection Procedures
- Minimize Donor Access to Water Sources During Collection
- Place Blueing Agent in Toilet
- Request Donor Photo ID
- Request Removal of Outer Clothing (coats, hats, backpacks)
- Have Donor Empty Pockets
- Have Donor Wash Hand Prior to Collection
- Witness Sample Collection
- Check Sample Temperature (90 - 100 degrees F)
- Perform Creatinine Testing (to identify dilute samples)

ORAL FLUID DRUG TESTING FOILS CHEATERS

Oral Fluid Tests are Always Observed

Oral fluid is primarily saliva and is easily collected with an absorptive device placed in the mouth. Collection takes only a few minutes and the collector observes the entire process from start to finish, thus eliminating attempts by the donor to cheat the test. Oral fluid testing preserves individual privacy while allowing for direct observation without embarrassment². If an



additional specimen is desired, either simultaneous collection or sequential collection can be part of the routine procedure. Oral fluid collections eliminate gender collection problems and “shy bladder” issues associated with urine collection, however, insufficient specimen volume can be an occasional problem for oral fluid collection if the collection time is too short or the individual suffers from “dry mouth”.

How Oral Fluid Tests Work

Salivary glands on the cheek and under the tongue supply the major fluid component to oral fluid. These glands have high blood flow; consequently drugs like cocaine migrate rapidly from blood to salivary glands and appear in saliva within minutes of drug administration³. For many of the major drugs of abuse, clinical studies have demonstrated parallel drug/metabolite relationships between oral fluid and blood. Thus,

oral fluid serves as a “window” into the body for most drugs. Detection times for drugs in oral fluid tend to be similar or longer than detection times in blood but generally shorter than in urine. Verstraete⁴, in a review of detection times of drugs of abuse in blood, urine and oral fluid, concluded that drugs can be detected for 5 to 48 hours in oral fluid as compared to 1.5 to 4 days in urine following a single drug dose and for a week or longer following chronic drug use.

Cannabis is different from most other drugs in the way it enters oral fluid primarily because of the “stickiness” of its key component, tetrahydrocannabinol (THC), the active ingredient of cannabis. During smoking or oral consumption, THC is deposited directly into mouth tissue and can be detected directly in oral fluid. Fortunately, the residence time of THC in the oral cavity is sufficient for detection over a similar time course as its presence in blood. Indeed, detection rates by oral fluid testing for marijuana and other drugs appear to be similar to or better than those seen in urine testing⁵. Figure 1 illustrates a study of private sector workplace tests with oral fluid compared with private sector workplace tests with urine. The overall positive prevalence rate (% positive tests in each population) for oral fluid was 5.1% and for urine was 4.5%. Data reported from Quest Diagnostics in a 5 year study ending in 2009 of over 4 million oral fluid samples, further substantiates these rates.

Following oral fluid collection, the specimen is typically placed in a sample vial containing a stabilizing buffer, sealed, and transported to a testing laboratory. From this point on, testing procedures are similar to those used in urine testing. Laboratory testing initially begins with a screening assay that eliminates negative specimens. Specimens that test presumptively positive are retested with a confirmation test that can accurately determine drug content. The specific drug or metabolite present is measured and, if the amount is sufficient to meet reporting criteria, the result is reported as positive. Both negative and positive results are sent to the authorizing agent, usually within 24-48 hours.

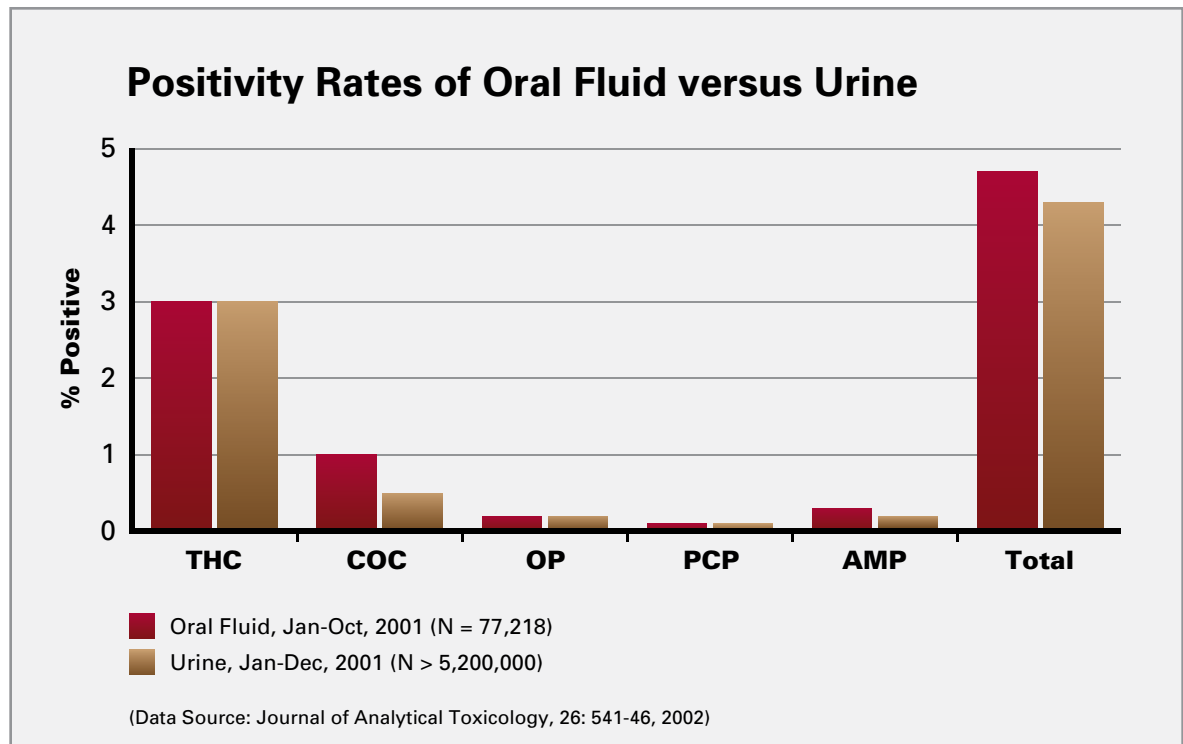


Figure 1. Prevalence rate of positive tests by oral fluid and urine in the private sector workplace.

Accuracy of Oral Fluid Laboratory Tests Versus POCTs

Although point-of-collection tests (POCTs) have the advantage of rapid results, their allure is diminished if the test is not sensitive enough or accurate. Unfortunately, POCT technology for oral fluid drug tests has not reached acceptable levels of sensitivity for each of the five primary classes of drug. For example, authors of a recent 2010 evaluation of eight oral fluid POCTs report that “In particular, it is evident that the cannabis and cocaine tests of the devices still lack sensitivity...”⁶. Most laboratories engaged in urine and oral fluid testing utilize instrumented immunoassay tests for drugs which meet FDA requirements for commercial distribution, thereby insuring the product has been thoroughly evaluated for accuracy and sensitivity

and has a clearly defined threshold cutoff. Oral fluid collection devices are also regulated. Currently, there are only a limited number of FDA-cleared oral fluid collection devices and associated screening assays. The most recognized oral fluid testing system is OraSure’s Intercept products. According to a 2010 survey of 26 drug testing providers, OraSure (Intercept®) was

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named by the vast majority of participants as the most recognized oral fluid testing brand name⁷. These laboratory-based tests are screened at the lab and negative results are reported within 24 hours - positive confirmations take up to 72.

ORAL FLUID DRUG TESTING FOILS CHEATERS

Ultra-sensitive Technologies Used in Oral Fluid Laboratory Tests

The growing popularity of oral fluid testing over the last two decades has been made possible through improvements in screening and confirmation technologies. Oral fluid specimens typically contain drugs and metabolites at considerably lower concentrations than in urine and are limited in volume generally to one milliliter or less. Thresholds, or “cutoffs” for oral fluid are at least ten-fold lower than urine and methods must be validated to enable reliable detection of recent drug use for the numerous classes of abused drugs^{8,9}. Analytical methods for measuring multiple drugs and metabolites in oral fluid require high sensitivity, specificity and accuracy. With the limited volume available for testing, comprehensive methodology had to be developed for simultaneous measurement of multiple analytes in a small volume of specimen. A recent comprehensive assay by liquid chromatography tandem mass spectrometry (LC/MS/MS) was described that was suitable for measuring 21 licit and illicit drugs and metabolites in a single oral fluid sample¹⁰. This state-of-the-art methodology is rapidly replacing older confirmation technologies in current use for urine testing.



An Enormous Scientific Literature Base Supports Oral Fluid Tests

The development of oral fluid tests for drugs of abuse has engendered the publication of a significant body of scientific literature on a variety of aspects of oral fluid testing. Several reviews document aspects of oral fluid testing including drug disposition^{9,11,12}, detection times⁴, diagnostics¹³, legal issues¹⁴, application of state-of-the-art technologies¹⁵⁻²⁰ and interpretation of results²¹.

Oral fluid (lab-based) tests offer an effective solution to persistent problems inherent in urine testing, including the dilution and adulteration tactics used by those who want to cheat a drug test.

Oral Fluid Instead of Urine?

Clearly, the growing and continually evolving problems of drug abuse demands novel strategies that reliably and reproducibly detect signs of abuse. The scientific community has endorsed oral fluid testing as a reliable methodology. Oral fluid tests offer an effective solution to persistent problems inherent in urine testing, including the dilution and adulteration tactics used by those who want to cheat a drug test. This established technology overcomes many of the problems of older methods by utilizing collection methods and technology that greatly surpasses older methods of drug detection. Oral fluid testing is changing the face of drug testing programs, improving ease of collection and reliability, while offering the same accuracy and precision across a broader spectrum of drugs of abuse as traditional drug testing methods. With all these advancements and the proven science, oral fluid drug testing would make a valuable addition to the tool box of methods utilized by Drug Court professionals.

Reference List

1. E.J. Cone, R. Lange, and W.D. Darwin. In vivo adulteration: Excess fluid ingestion causes false-negative marijuana and cocaine urine test results. *J. Anal. Toxicol.* **22**: 460-473 (1998).
2. E.J. Cone. Oral fluid testing: New technology enables drug testing without embarrassment. *California Dental Association* **34**: 311-315 (2006).
3. E.J. Cone. Pharmacokinetics and pharmacodynamics of cocaine. *J. Anal. Toxicol.* **19**: 459-478 (1995).
4. A.G. Verstraete. Detection times of drugs of abuse in blood, urine, and oral fluid. *Ther. Drug Monit.* **26**: 200-205 (2004).
5. E.J. Cone, L. Presley, M. Lehrer, W. Seiter, M. Smith, K. Kardos, D. Fritch, S. Salamone, and R.S. Niedbala. Oral fluid testing for drugs of abuse: Positive prevalence rates by Intercept™ immunoassay screening and GC-MS-MS confirmation and suggested cutoff concentrations. *J. Anal. Toxicol.* **26**: 541-546 (2002).
6. T. Blencowe, A. Pehrsson, P. Lillsunde, K. Vimpari, S. Houwing, B. Smink, R. Mathijssen, T. Van der Linden, S.A. Legrand, K. Pil, and A. Verstraete. An analytical evaluation of eight on-site oral fluid drug screening devices using laboratory confirmation results from oral fluid. *Forensic Sci. Int.* (2010).
7. W.F. Current. Get the Most Out of Drug Testing: Stop Drug Test Cheating. (2010).
8. S.V. Kala, S.E. Harris, T.D. Freijo, and S. Gerlich. Validation of analysis of amphetamines, opiates, phencyclidine, cocaine, and benzoylecgonine in oral fluids by liquid chromatography-tandem mass spectrometry. *J. Anal. Toxicol.* **32**: 605-611 (2008).
9. O.H. Drummer. Drug testing in oral fluid. *Clin. Biochem. Rev.* **27**: 147-159 (2006).
10. D. Fritch, K. Blum, S. Nonnemacher, B.J. Haggerty, M.P. Sullivan, and E.J. Cone. Identification and quantitation of amphetamines, cocaine, opiates, and phencyclidine in oral fluid by liquid chromatography-tandem mass spectrometry. *J. Anal. Toxicol.* **33**: 569-577 (2009).
11. F.M. Wylie, H. Torrance, A. Seymour, S. Buttress, and J.S. Oliver. Drugs in oral fluid Part II. Investigation of drugs in drivers. *Forensic Sci. Int.* **150**: 199-204 (2005).
12. K. Pil and A. Verstraete. Current developments in drug testing in oral fluid. *Ther. Drug Monit.* **30**: 196-202 (2008).
13. R.E. Choo and M.A. Huestis. Oral fluid as a diagnostic tool. *Clin. Chem. Lab Med.* **42**: 1273-1287 (2004).
14. L. Kadehjian. Legal issues in oral fluid testing. *Forensic Sci. Int.* **150**: 151-160 (2005).
15. H.H. Maurer. Advances in analytical toxicology: the current role of liquid chromatography-mass spectrometry in drug quantification in blood and oral fluid. *Anal. Bioanal. Chem.* **381**: 110-118 (2005).
16. W.M. Bosker and M.A. Huestis. Oral fluid testing for drugs of abuse. *Clin. Chem.* **55**: 1910-1931 (2009).
17. O.H. Drummer. Introduction and review of collection techniques and applications of drug testing of oral fluid. *Ther. Drug Monit.* **30**: 203-206 (2008).
18. E.L. Oiestad, U. Johansen, and A.S. Christophersen. Drug screening of preserved oral fluid by liquid chromatography-tandem mass spectrometry. *Clin. Chem.* **53**: 300-309 (2007).
19. N. Samyn, M. Laloup, and G. De Boeck. Bioanalytical procedures for determination of drugs of abuse in oral fluid. *Anal. Bioanal. Chem.* **388**: 1437-1453 (2007).
20. M. Concheiro, A. de Castro, O. Quintela, A. Cruz, and M. Lopez-Rivadulla. Determination of illicit and medicinal drugs and their metabolites in oral fluid and preserved oral fluid by liquid chromatography-tandem mass spectrometry. *Anal. Bioanal. Chem.* **391**: 2329-2338 (2008).
21. E.J. Cone and M.A. Huestis. Interpretation of oral fluid tests for drugs of abuse. *Ann. N. Y. Acad. Sci.* **1098**: 51-103 (2007).



About NADCP

It takes innovation, teamwork and strong judicial leadership to achieve success when addressing drug-using offenders in a community. That's why since 1994 the National Association of Drug Court Professionals (NADCP) has worked tirelessly at the national, state and local level to create and enhance Drug Courts, which use a combination of accountability and treatment to compel and support drug-using offenders to change their lives.

Now an international movement, Drug Courts are the shining example of what works in the justice system. Today, there are over 2,500 Drug Courts operating in the U.S., and another thirteen countries have implemented the model. Drug Courts are widely applied to adult criminal cases, juvenile delinquency and truancy cases, and family court cases involving parents at risk of losing custody of their children due to substance abuse.

Drug Court improves communities by successfully getting offenders clean and sober and stopping drug-related crime, reuniting broken families, intervening with juveniles before they embark on a debilitating life of addiction and crime, and reducing impaired driving.

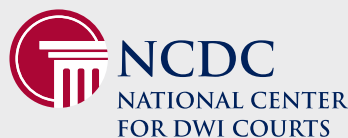
In the 20 years since the first Drug Court was founded in Miami/Dade County, Florida, more research has been published on the effects of Drug Courts than on virtually all other criminal justice programs combined. The scientific community has put Drug Courts under a microscope and concluded that Drug Courts significantly reduce drug abuse and crime and do so at far less expense than any other justice strategy.

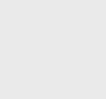
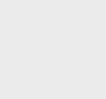
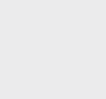
Such success has empowered NADCP to champion new generations of the Drug Court model. These include Veterans Treatment Courts, Reentry Courts, and Mental Health Courts, among others. Veterans Treatment Courts, for example, link critical services and provide the structure needed for veterans who are involved in the justice system due to substance abuse or mental illness to resume life after combat. Reentry Courts assist individuals leaving our nation's jails and prisons to succeed on probation or parole and avoid a recurrence of drug abuse and crime. And Mental Health Courts monitor those with mental illness who find their way into the justice system, many times only because of their illness.

Today, the award-winning NADCP is the premier national membership, training, and advocacy organization for the Drug Court model, representing over 27,000 multi-disciplinary justice professionals and community leaders. NADCP hosts the largest annual training conference on drugs and crime in the nation and provides 130 training and technical assistance events each year through its professional service branches, the **National Drug Court Institute**, the **National Center for DWI Courts** and **Justice for Vets: The National Veterans Treatment Court Clearinghouse**. NADCP publishes numerous scholastic and practitioner publications critical to the growth and fidelity of the Drug Court model and works tirelessly in the media, on Capitol Hill, and in state legislatures to improve the response of the American justice system to substance-abusing and mentally ill offenders through policy, legislation, and appropriations.

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